Prevalence of respirator/dust mask use among U.S. primary farm operators
Analysis of the 2006 Farm and Ranch Survey

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Background

- In 2006, an estimated 2.1 million primary farm operators were employed in agriculture.
- Inorganic and organic dusts, pesticides, and toxic gases are common agricultural hazards that have been shown to be associated with respiratory diseases including chronic bronchitis, pulmonary fibrosis, asthma, hypersensitivity pneumonitis, and organic dust toxic syndrome (Schenker, 1998).
- Use of respirators are effective in minimizing/preventing exposure to airborne hazards.
- There is limited information on respirator/dust mask use among farm operators.

Objectives

- To estimate prevalence of respirator/dust mask use and to describe hazards for which respirators/dust masks are used among primary farm operators.

Methods

Data source

- The 2006 Farm and Ranch Safety Survey conducted by the U.S. Department of Agriculture, National Agricultural Statistics Service.
- Survey sample included 25,000 farms and information from 14,159 (57%) farms was collected; 12,278 (87%) were actively farming and included in this analysis. Adjusted survey response rate was 75%.

Definitions

- **Respirator/dust mask use** (coded as *yes/no*)
  - *In the last 12 months, have (you/the farm operator) used a respirator or dust mask on your farm or ranch?* If yes then …
    - *When working in dusty environments?* **(Dusty environment)**
    - *When using pesticides?* **(Using pesticides)**
    - *For other work activities on the farm besides using pesticides or in dusty environments?* **(Other)**
- **Selected exposures** (coded as *yes* if more than one time and *no* if none, or as yes/no)
  - *How many times in the last 12 months (have you/has the farm operator) …*
    - *used the welder or oxy-acetylene system?* **(Welding)**
    - *entered the manure pit(s)?* **(Manure)**
    - *handled or applied anhydrous ammonia?* **(Ammonia)**
    - *breathed moldy dust from things such as hay, straw, grain, wood chips, or any other agricultural products?* **(Mold)**
  - *What is the total number of hours that (you/the farm operator) personally operated ALL of the diesel tractors in the last 12 months?* **(Diesel)**
  - *(Do you/Does the farm operator) bale hay or straw on the farm?* **(Bale hay)**
- **Region**
  - North: Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont
  - Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin
  - South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia
  - West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, and Wyoming
- **Farm type**
  - Crops: Grains; Tobacco; Cotton & cotton seed; Vegetables, melons, potatoes & sweet potatoes; Fruit, tree nuts & berries; and Other crops
  - Livestock: Hogs & pigs; Cattle & calves; Milk & other dairy products; Sheep, goats & their products; Horses, ponies & mules; Poultry & eggs; and Other animals & animal products
  - Other: Aquaculture; Nursery, greenhouse, floriculture and sod; and Cut Christmas trees and short rotation woody crops

Analysis

- Estimated prevalences (%) and prevalence odds ratios (PORs)
- Sample weights used to account for the complex sample design
- Refused/unknown/missing responses included in calculation of estimates
- SAS® software version 9.2 (SAS Institute Inc., Cary, NC) survey procedures

Results

Table 1. Characteristics of primary farm operators and prevalence of respirator/dust mask use.

Characteristics	No. in sample	Estimated %	Respirator/dust mask use[1]	
			% (95% CI)	POR (95% CI)
Operator[1]				
Age group (years)				
16–34	286	2.3	46.9 (39.3–54.4)	2.0 (1.5–2.8)
35–64	8,081	66.1	40.7 (39.3–42.1)	1.6 (1.4–1.8)
≥ 65	3,609	29.3	30.0 (28.1–31.9)	1.0
Gender				
Male	10,885	88.1	38.9 (37.8–40.1)	2.0 (1.7–2.4)
Female	1,381	11.8	24.4 (21.4–27.4)	1.0
Second job				
Yes	5,554	49.5	36.9 (35.3–38.5)	1.0 (0.9–1.0)
No	6,663	50.0	37.8 (36.3–39.2)	1.0
Farm				
Region				
North	2,869	6.3	35.3 (33.4–37.3)	1.0
Midwest	2,998	37.5	40.0 (38.2–41.8)	1.2 (1.1–1.4)
South	3,340	42.2	33.7 (31.8–35.6)	0.9 (0.8–1.0)
West	3,071	14.1	41.1 (39.2–42.9)	1.3 (1.1–1.4)
Farm type				
Crops	5,735	46.3	40.5 (38.8–42.1)	1.3 (1.2–1.5)
Livestock	5,905	50.8	33.7 (32.2–35.3)	1.0
Other	638	2.9	45.5 (40.1–50.8)	1.7 (1.3–2.1)
Farm size (value of sales)				
< $100,000	9,164	83.8	33.3 (32.1–34.5)	1.0
≥ $100,000	3,114	16.2	57.3 (55.3–59.3)	2.7 (2.5–3.0)
Farm size (acres)				
≤ 300	8,987	80.7	34.2 (32.9–35.5)	1.0
301–700	1,620	9.9	46.2 (43.3–49.1)	1.7 (1.5–1.9)
>700	1,671	9.4	53.4 (50.8–56.1)	2.2 (2.0–2.5)
Exposures[1]				
Welding				
Yes	6,544	49.6	46.0 (44.4–47.5)	2.1 (1.9–2.3)
No	5,556	48.9	29.2 (27.7–30.8)	1.0
Manure				
Yes	136	0.6	54.1 (41.6–66.7)	2.0 (1.2–3.3)
No	12,000	98.2	37.5 (36.4–38.6)	1.0
Ammonia				
Yes	1,031	9.0	53.6 (49.9–57.3)	2.0 (1.7–2.4)
No	11,180	90.6	35.7 (34.5–36.8)	1.0
Mold				
Yes	5,781	45.6	46.5 (44.9–48.2)	2.0 (1.8–2.2)
No	6,399	53.6	29.5 (28.1–30.9)	1.0
Diesel				
Yes	9,031	69.2	41.9 (40.6–43.2)	1.9 (1.7–2.1)
No	2,954	28.5	27.4 (25.4–29.5)	1.0
Bale hay				
Yes	5,558	40.3	41.4 (39.7–43.1)	1.3 (1.2–1.5)
No	6,626	58.9	34.8 (33.3–36.2)	1.0
TOTAL	**12,278**		**37.2 (36.1–38.3)**	

CI = confidence interval
[1] Numbers may not add up to total due to unknown/refused/missing data (302 for age, 12 for gender, 61 for second job, 178 for welding, 142 for manure, 67 for ammonia, 98 for mold, 293 for diesel, 94 for bale hay, and 207 for respirator/dust mask use).

Table 2. Proportion of primary farm operators using respirator/dust mask, by work activity.

Characteristics	Dusty environment	Using pesticides	Other
	% (95% CI)	% (95% CI)	% (95% CI)
Operator			
Age group (years)			
16–34	78.9 (70.1–87.8)	22.2 (13.2–31.1)	30.6 (20.7–40.6)
35–64	71.1(69.1–73.0)	23.2 (21.4–24.9)	29.7 (27.7–31.6)
≥ 65	65.8 (62.3–69.4)	20.9 (18.0–23.7)	32.9 (29.4–36.5)
Gender			
Male	69.9 (68.2–71.7)	22.9 (21.3–24.4)	30.0 (28.2–31.7)
Female	69.8 (63.5–76.2)	19.2 (14.2–24.2)	36.1 (29.4–42.8)
Second job			
Yes	77.4 (68.9–73.8)	21.5 (19.3–23.7)	29.6 (27.1–32.1)
No	68.5 (66.3–70.8)	23.6 (21.6–25.6)	31.2 (28.9–33.5)
Farm			
Region			
North	60.9 (57.6–64.2)	28.2 (25.3–31.2)	28.4 (25.2–31.5)
Midwest	73.4 (70.7–76.0)	17.0 (14.9–19.1)	29.5 (26.8–32.2)
South	69.3 (66.2–72.4)	24.5 (21.6–27.4)	32.3 (29.1–35.5)
West	65.9 (63.2–68.7)	30.4 (27.8–33.0)	28.9 (26.3–31.6)
Farm type			
Crops	70.4 (68.2–72.7)	24.5 (22.4–26.6)	28.2 (25.9–30.4)
Livestock	71.0 (68.4–73.5)	18.6 (16.5–20.8)	32.9 (30.3–35.6)
Other	49.0 (41.3–56.6)	47.7 (40.1–55.3)	30.0 (22.8–37.2)
Farm size (value of sales)			
< $100,000	69.4 (67.3–71.4)	21.7 (19.9–23.5)	31.3 (29.2–33.4)
≥ $100,000	71.6 (69.1–74.0)	25.5 (23.1–27.8)	27.9 (25.5–30.4)
Farm size (acres)			
≤ 300	68.4 (66.3–70.4)	23.1 (21.3–24.9)	31.2 (29.1–33.3)
301–700	71.9 (68.0–75.8)	19.8 (16.4–23.1)	28.6 (24.8–32.5)
>700	76.6 (73.5–79.7)	22.5 (19.4–25.6)	27.9 (24.6–31.2)
TOTAL	**69.9 (68.3–71.6)**	**22.6 (21.1–24.1)**	**30.4 (28.7–32.1)**

CI = confidence interval

Summary

- Prevalence of respirator/dust mask use was the highest among those < 35 years of age, males, operators from the West, operations other than livestock and crops, operators on farms with ≥ $100K value of sales, and operators on farms with > 700 acres.
- Operators were about two times more likely to have used a respirator/dust mask if they had done these activities: welded, entered manure pits, applied anhydrous ammonia, breathed moldy dust, or used diesel tractors.
- Among operators who had used a respirator/dust mask, 70% used them while working in a dusty environment.

Limitations

- Data self-reported and not independently verified by “on-farm” hazard assessment.
- No information on the type of respirator used.
- No information on whether the respirator/dust mask was used at the time of exposure.

Conclusion

- Future studies are needed to better understand factors associated with respirator use on farms including operator’s knowledge on the proper respirator selection, use, and maintenance.

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.